A not immaterial, nanomaterial partner for licensing technology

Applied NanoWorks Inc, with a half dozen people working out of Rensselaer Polytechnic Institute's business incubator facility is working on a way for producing as many as 64 types of nanoparticles.

The process, which ANW has licensed from RPI, can be used to make semiconducting QDs and particles of pure metals such as silver, copper and gold

CEO, Eric Burnett, says ANW can form not only some of the smallest nanoparticles, but also in very narrow size distributions, Most particles come at around 3nm, but zinc oxide runs as low as 2nm, 80% smaller than currently available zinc oxide powders. (ANW expects to sell this soon in test quantities.The zinc oxide market consumes 250m kgs/year.)

A room-temperature process initially delivers, in commercial volumes, 12 types of nanoparticles created in water, rather than dry powders, without a lot of high-tech equipment. Dedicated work with crystal growth, has given way to test batches of nanoparticles and QDs produced by bucket, beaker, blender and rubbish bin.

The company says that producing nanoparticles in water helps keep them from clumping, as they can in powder form. Made and transported in water is 'greener' to ship and handle than solvent, and less likely to pose public concern health hazards.

While Burnett is in the 'getting to know' stage with venture capital firms he notes corporate customers could want to invest as ANW moves to licensing the technology to strategic partners.

Source:www.smalltimes.com/document_display.cfm?document_id=7704

Metamorphose network

Metamaterials ORganized for radio, millimeter wave, and PHOtonic Superlattice Engineering is a project to coordinated the development of new types of 'metamaterials' with electromagnetic properties not found naturally. It is the aim of the Metamorphose network, of which the public University of Navarre forms part, together with twenty-one other research institutions from 13 EU countries.

Results of this development should lead to a conceptually new range of radio, microwave, and optical technologies, based on revolutionary new materials made by large-scale assembly of some basic elements (microscopic and nanoscopic) in unprecedented combinations. One example, the recent theoretical concept for perfect planar lenses made with negative-refraction index ("left-handed") metamaterials. These lenses would enable resolution limitations in many optical and electromagnetic systems to be overcome and go beyond the diffraction limits of conventional materials. Just with this example, multiple applications in several IT and life science areas can be predicted: such as enhanced image systems; higher capacity systems for the optical data storage; and more compact integrated optical telecommunications solutions.

Moreover, Metamorphose wishes to serve as a tool in joint research through the creation of a Virtual Institute, which will pull together efforts in key research areas, extending excellence and transferring the new technology to European industry. There is a plan to create an international PhD programme in this new field, as well as a university school for metamaterials.

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Inorganic spin coat process for TFTs

A new spin-on process for inorganic semiconductor films, developed at IBM Corp's Thomas J Watson Research Center, could revolutionise thin-film transistor (TFT) technology. The process makes use of a catalyst to allow the formation of very thin 50nm films of chalcogenide compounds (tin, sulphur and selenium). High throughput spin-on processes have been developed for organic TFTs, but the mobilities of organics are lower than inorganic semiconductors and this opens up the solution based processes of organics to higher performance inorganics.

Organic semiconductors such as pentacene dissolve easily in solvents and are easy to spin onto a substrate at low temperature. Other processes available to organic solutions are ink-jet printing and stamping.

Chalcogenide films have electron mobilities ten times the best organics, but are electronically and structurally more robust. Inorganic semiconductor films can be produced by CVD or vacuum deposition but require a high temperature substrate to form. Chalcogenides have not been a major player in semiconductor technology, but new chemistry of the chalcogenides can be reworked with various catalysts and materials.

The breakthrough came with a two-stage inorganic process. A highly reactive organic compound, hydrazine creates a transitional compound with the tin, sulphur and selenium. The bonds here easily dissolve in water. A solution of the hydrazine-mediated compounds is then spin-coated on a substrate. That film is heated to around 250° C, when the hydrazine is forced out and the inorganics elements form into a chalcongenide.

Prototype TFTs were built with the films that showed mobilities of 10 cm^2 per volt per second, ten times the figure for the best organic TFTs. The annealing temperature is low for standard semiconductor processes, but in the mid range for large area plastic substrates, that might be used in flat panel displays.